

Appln. No. 10/799,385
Amdt. dated January 10, 2006
Reply to Office Action of July 11, 2005

REMARKS/ARGUMENTS

Reconsideration of the present application, as amended, is respectfully requested.

The July 11, 2005 Office Action and the Examiner's comments have been carefully considered. In response, claims are amended and remarks are set forth below in a sincere effort to place the present application in form for allowance. The amendments are supported by the application as originally filed. Therefore, no new matter is added.

ALLOWABLE SUBJECT MATTER

The Examiner's indication that claims 5-7 are allowed is acknowledged and appreciated. Claims 6 and 7 are amended herein to correct typographical errors of which Applicants have become aware. No new matter is added.

REJECTION UNDER 35 USC 112, SECOND PARAGRAPH

In the Office Action claims 3, 4 and 8-11 are rejected under the second paragraph of 35 USC 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In response, claims 3, 4 and 8-11 are amended in a sincere effort to

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overcome the indefiniteness rejection. In view of the amendment of claims 3, 4 and 8-11, reconsideration and withdrawal of the rejection under the second paragraph of 35 USC 112 are respectfully requested.

PRIOR ART REJECTION

In the Office Action, claims 1-4 and 8-11 are rejected under 35 USC 102(b) as being anticipated by USP 5,106,268 (Kawamura et al.).

The present application (see paragraph [0006] on page 2) indicates that the field of application to which the invention relates is pumps for use in open circuit arrangements wherein liquid is delivered through a nozzle, such that the pressure of liquid delivered is a function of the velocity of movement of the piston of the plunger pump. Hence, in the context of the present invention, the expression "feed rate" refers to the actual velocity of the piston and not to the amount of liquid delivered by the pump. Hence, claim 1 relates to an apparatus in which the parameter which is adjusted is the velocity of the piston (plunger) of the reciprocating pump and in which constant delivery is obtained by ensuring that the piston moves at a constant velocity (optimum feed rate).

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Independent claim 1 is amended to more clearly define the present claimed invention over the cited reference.

Kawamura et al. teach a pressure control system for an electromagnetic reciprocating pump which can maintain the actual outlet pressure at a predetermined value. According to the teachings of Kawamura et al., the actual outlet pressure of the electromagnetic reciprocating pump is detected by a pressure sensor. The frequency of the reciprocating motion and, if necessary, the stroke of the electromagnetic drive means are feedback controlled by using the deviation from the preset outlet pressure of the actual outlet pressure detected by the pressure sensor (see column 1, line 62 to column 2, line 1 of Kawamura et al.). This means that the frequency or stroke of the reciprocating motion is the parameter which varies in proportion as the error signal $E (= F(P_s - P_i))$ varies (Fig. 3). In case the frequency or stroke of the reciprocating motion is varied, however, the actual velocity of the pistons is never constant. The velocity is varied in an essentially sinusoidal manner throughout the operation cycle of the electromagnetic drive means. The combination of electromagnetic linear motors (26, 27) and the essentially sinusoidal velocity variations of the pumps as shown in the embodiment of Kawamura et al. teaches that they

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do not exhibit the marked pressure fluctuations exhibited by pumps of the type in which the reciprocating motion of the plungers are driven by a rotary servo motor (to which the present invention is directed). Hence, the problem addressed by the present invention does not arise and is not a consideration in the applied prior art.

Claim 1 of the present invention recites the features of:

means to control the reciprocating motion of the plurality of plungers through rotary servo motor means depending on the result of the comparison to make the actual delivery pressure value reach the predetermined threshold if the threshold has not been reached;

means to determine the feed rate as an optimum feed rate of the reciprocating motion of the plurality of plungers when the threshold is reached; and

means to control the feed rate of the reciprocating motion of the plurality of plungers through said rotary servo motor means at said optimum feed rate after the threshold has been reached.

The present claimed invention is directed to an arrangement in which the plurality of plungers are driven with an open control at a first constant rate (the fastest possible) when the

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deviation between actual pressure and the desired value lies outside a threshold value, varying the rate of the plurality of plungers towards a rate which will cause the desired pressure to be achieved when the pressure is closer to the desired value, and then driving the plungers with a feedback control at a second constant rate (optimum feed rate) corresponding with the desired pressure value after the deviation is within the threshold value. Such an arrangement is not disclosed, taught or suggested in Kawamura et al.

Kawamura et al. teaches continuous proportional control in which a signal representing the desired output is compared with the outlet pressure throughout the operation cycle of the pump. There is no disclosure, teaching, or suggestion of maintaining the feed rate of a reciprocating motion at a first constant rate if the threshold has not been reached, and then at a second constant rate after the threshold has been reached as recited in amended claim 1.

In view of the foregoing, claim 1 is patentable over Kawamura et al. under 35 USC 102 as well as 35 USC 103.

Claims 2-4 and 8-11 are either directly or indirectly dependent on claim 1 and are patentable over the cited references in view of their dependence on claim 1 and because the references

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do not disclose, teach or suggest each of the limitations set forth in claims 2-4 and 8-11.

In view of all of the foregoing, claims 1-4 and 8-11 are in form for allowance along with allowed claims 5-7.

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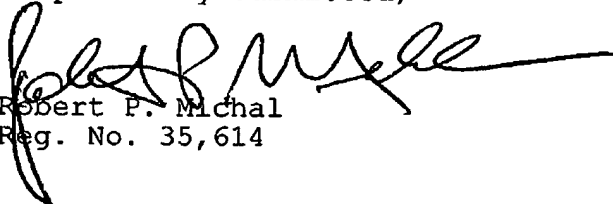
If the Examiner disagrees with any of the foregoing, the Examiner is respectfully requested to point out where there is support for a contrary view.

Entry of this Amendment, allowance of the claims, and the passing of this application to issue are respectfully solicited.

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If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,



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Encls.: Petition for Extension of Time